



HAL
open science

Intraventricular ejection pressure gradient derived from acceleration measurement by phase contrast CMR as a new marker of left ventricular contractility: feasibility study and preliminary results in dilated cardiomyopathy

Laurent Macron, Emilie Bollache, Nadjia Kachenoura, Alain de Cesare, Golmehr Ashrafpoor, Arshid Azarine, Alban Redheuil, Elie Mousseaux

► To cite this version:

Laurent Macron, Emilie Bollache, Nadjia Kachenoura, Alain de Cesare, Golmehr Ashrafpoor, et al.. Intraventricular ejection pressure gradient derived from acceleration measurement by phase contrast CMR as a new marker of left ventricular contractility: feasibility study and preliminary results in dilated cardiomyopathy. *Journal of Cardiovascular Magnetic Resonance*, 2013, 15 (Suppl 1), pp.E6. inserm-00782659

HAL Id: inserm-00782659

<https://inserm.hal.science/inserm-00782659>

Submitted on 30 Jan 2013

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

POSTER PRESENTATION

Open Access

Intraventricular ejection pressure gradient derived from acceleration measurement by phase contrast CMR as a new marker of left ventricular contractility: feasibility study and preliminary results in dilated cardiomyopathy

Laurent Macron^{1*}, Emilie Bollache², Nadjia Kachenoura², Alain De Cesare², Golmeh Ashrafpoor¹, Arshid Azarine¹, Alban Redheuil^{1,2}, Elie Mousseaux^{1,2}

From 16th Annual SCMR Scientific Sessions
San Francisco, CA, USA. 31 January - 3 February 2013

Background

Intra-ventricular pressure gradient along the direction of the outflow tract is generated by the impulse response of the myocardial contraction. This spatial pressure gradient, derived from the maximal acceleration estimates within the left ventricular (LV) ejection flow, has been validated in vitro by using MRI and was found strongly related to the inotropic state of the LV as demonstrated in animal and human echocardiographic studies. This acceleration may be less dependant on load conditions than others LV systolic function parameters, especially LV ejection fraction (LVEF).

Aim: (1) to evaluate the feasibility of LV ejection flow acceleration (Acc) estimates by spatial and temporal derivative of velocities recorded by CMR using phase contrast sequence, (2) to compare the acceleration values to LVEF in patients with Dilated Cardiomyopathy (LVEF<50%) and in control subjects.

Methods

Ten DCM patients (54±12 years, 60%men) and 14 age-matched controls underwent CMR with cine sequences to determine LV volumes and LVEF. Through plane phase contrast acquisitions were obtained in breathhold (TR = 7.5 ms, TE = 2.5 ms, 2 views per segment, temporal resolution = 15 ms, FOV 32 to 36 cm with 126 x 256 matrix) at 2 consecutive levels, at the level of aortic

valve and 10 mm below through the LV outflow tract. Total Acceleration (TotalAcc) and its two components, Temporal (TempAcc) and Convective (ConvAcc) Acceleration were derived from velocities at phase contrast sequence by using our home-made previously validated semi-automatic software Art Fun.

Results

eleration measurement was feasible in all DCM and controls. Overall, TempAcc (r=0.50, p=0.01) but not ConvAcc (r=0.33, p=0.11) correlated with LVEF. Nevertheless, TotalAcc was better correlated to LVEF (r=0.71, p=0.0001) than TempAcc derived from velocities obtained at the level of the aortic valve alone. Compared to control, mean LVEF (30±13 vs. 66±6, p<0.0001) TotalAcc (880±463 vs 1909±637 cm.s⁻², p<0.001) and TempAcc (660±399 vs 1294±574 cm.s⁻², p<0.01) but not ConvAcc (706±508 vs 1044±747 cm.s⁻², p=0.22) were significantly lower in DCM.

Conclusions

This preliminary study demonstrated the feasibility of LV ejection flow acceleration measurement derived from velocities at phase contrast sequence by CMR. TotalAcc is highly correlated to LVEF, better than TempAcc alone underlying the incremental value of ConvAcc.

¹Radiology, Cardiovascular Imaging Unit, HEGP, APHP, Paris, France
Full list of author information is available at the end of the article

Funding

none.

Author details

¹Radiology, Cardiovascular Imaging Unit, HEGP, APHP, Paris, France. ²LIF INSERM U678, UPMC, Paris, France.

Published: 30 January 2013

doi:10.1186/1532-429X-15-S1-E6

Cite this article as: Macron *et al.*: Intraventricular ejection pressure gradient derived from acceleration measurement by phase contrast CMR as a new marker of left ventricular contractility: feasibility study and preliminary results in dilated cardiomyopathy. *Journal of Cardiovascular Magnetic Resonance* 2013 **15**(Suppl 1):E6.

Submit your next manuscript to BioMed Central
and take full advantage of:

- Convenient online submission
- Thorough peer review
- No space constraints or color figure charges
- Immediate publication on acceptance
- Inclusion in PubMed, CAS, Scopus and Google Scholar
- Research which is freely available for redistribution

Submit your manuscript at
www.biomedcentral.com/submit

